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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/727,031	12/02/2003	Je-Kwang Cho	5649-1212	4447
20792	7590	06/30/2005	EXAMINER	
MYERS BIGEL SIBLEY & SAJOVEC			SHINGLETON, MICHAEL B	
PO BOX 37428			ART UNIT	PAPER NUMBER
RALEIGH, NC 27627			2817	

DATE MAILED: 06/30/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/727,031

Applicant(s)

CHO, JE-KWANG

Examiner

Michael B. Shingleton

Art Unit

2817

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-31 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-8, 10-20 and 23-29 is/are rejected.
- 7) ☒ Claim(s) 9, 21, 22, 30 and 31 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 2/05 and 12/03.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_.

## DETAILED ACTION

### *Claim Objections*

Claim 20 is objected to because of the following informalities: Claim 20 recites “pn-unction diode” which is clearly in error and should be “pn-junction diode”. Appropriate correction is required.

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-8, 10-20, and 23-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yin 6,909,332 (Yin) in view of Yang et al. 6,836,192 (Yang) and Prakash et al. 5,648,744 (Prakash).

Figure 14b and the relevant text of Yin discloses a voltage controlled oscillator arrangement (vco) and method for changing the oscillation frequency of a vco having a vco 2702 and a variable capacitance arrangement 2706 that tunes the vco. Yin is silent on the details of the vco amplifier structure which includes the claimed features of a transconductance amplifier with an inductance that resonates with the variable capacitance element 2706. However, this is a well-known form of vco. See Figure 2 of Yang. Accordingly, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized a vco transconductance amplifier having an inductor that resonates with an variable capacitor because, as the Yin reference is silent on the exact vco circuit used in the Figure 14b embodiment one of ordinary skill in the art would have been motivated to use any art-recognized equivalent vco such as the conventional vco amplifier structure of Yang.

The variable capacitance structure like that of applicant's invention is composed of three sections. The first being the switched capacitor section where the coarse tuning is preformed, the second is also a switched capacitor arrangement where the fine tuning is preformed and the third is the varactor where the voltage thereon controls the frequency of the vco. While Yin does not explicitly show the control signals that control the switching elements they are clearly present in Yin otherwise the electronic switches would not switch. Also Yin does not show the control circuit that produces these signal,

however, such a control circuit must be present in Yin otherwise the control signals would not be produced and the switches would not be switched. Yin is clearly operable and thus Yin has these features. Also note that the switches of Yin are either on or off and thus are “digital”. The limitations like “while limiting a variation in gain of the amplifier across a range of oscillation frequencies” and “simultaneously to limit variations in a gain of the amplifier when changing the oscillation frequency” are broad limitations. These limitations do not specify how much the variation in gain is limited when the frequency is changed and thus Yin will limit the variation in gain when the frequency is changed to some amount across the range of oscillation frequencies. The limiting of the variation in gain may not be very good, but it will be limited and the claims just do not recite how much the variation in gain is limited. The claims recite that one of the switched capacitor sections employs varactors as the capacitive elements. Yin is silent on the exact structure of the capacitance that make-up the fine-tuning section. Prakash shows in Figure 2 that one common variable switch capacitor device is the switched varactor device wherein the control signal from the non-switched varactor is also connected to this arrangement. It appears that such a connection reduces phase noise (See column 1, around line 39). Accordingly, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have replaced the capacitive elements of the fine switched capacitance arrangement and utilized varactors connected in place thereof with the varactors connected to the analog control voltage because, as the Yin reference is silent on the exact structure of the capacitance elements of the fine switch capacitance arrangement one of ordinary skill in the art would have been motivated to use any art-recognized equivalent switched capacitor structure such as the conventional switched capacitor structure of Prakash. One of ordinary skill in the art would have been additionally been motivated to make the combination so as to improve phase noise characteristics of the vco.

Yin is silent on whether or not the vco circuit is used on a phase locked loop circuit. However, the vco component shown in Figure 14b is clearly meant to be a component of a larger system. Yin does recite that the vco 2702 is to be part of a clock circuit that has a frequency divider (See column paragraph [0080]).

One well-known use for a clock circuit, i.e. a vco followed by a frequency divider is a phase locked loop (pll) arrangement. Accordingly, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used the clock circuit of Yin in a pll arrangement because, as the reference is silent on the exact use of the Figure 14B arrangement one of ordinary skill in the art would have been motivated to use the component in any art-recognized system that employs a

conventional clock, i.e. a vco followed by a frequency divider as part of it system such as the in a conventional pll arrangement.

Yin is silent on the construction of the varactor. However, one conventional construction for a varactor includes a pn-junction diode.

Accordingly, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized a varactor with a pn-junction construction for the varactor of Yin because, as the Yin reference is silent on the exact construction of the varactor one of ordinary skill in the art would have been motivated to use any art-recognized equivalent varactor such as the conventional varactor constructed of a pn-junction.

Yang shows the use of FETs for the transistor elements that make up the vco amplifier. However, it is well known common knowledge in the art that bi-polars can take the place of FETs thereby forming the same circuit except that bi-polars are the transistor elements. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have replaced the FETs of Yang with bi-polar transistors since the examiner takes Official Notice of the equivalence of the bi-polar and the FET for their use in the electronic circuit art and the selection of any of these known equivalents to provide a transistor function would be within the level of ordinary skill in the art.

Claims like 7, 8, 17, 26 and 27 recite the selection of the capacitance values of the capacitors and the varactors that make up the switched arrangements. This is merely the selection of the result effective variable that determines the size of the capacitive steps i.e. this is a mere optimization the selection of the workable range which involves routine skill in the art. I would have been obvious to one having ordinary skill in the art at the time the invention was made to have selected the values of the capacitors to change in the manner claimed, since it has been held that discovering an optimum value or a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Claim 9, 21, 22, 30 and 31 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael B. Shingleton whose telephone number is (571) 272-1770.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Pascal, can be reached on (571)272-1769. The fax phone number for the organization where this

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application or proceeding is assigned is 703-872-9306 and after July 15, 2005 the fax number will be (571)-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

MBS

June 23, 2005

  
MICHAEL B SHINGLETON  
PRIMARY EXAMINER  
GROUP 1 PART I INT 9A17